

a surface photovoltaic sensor comprising a plurality of electrodes positioned adjacent said first surface to detect a surface photovoltaic induced at said first surface of said semiconductor wafer in response to said light without contacting said wafer, said plurality of electrodes sufficient for detecting said surface photovoltaic on said first surface; and

said surface photovoltaic sensor of said head assembly located within said sealed chamber.

RESPONSE

The Office Action has been carefully considered and the foregoing amendments and following remarks are made in response thereto. Claims 53-57 are pending in the application. Claims 53-57 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Number 5,091,691 to Kamieniecki ("Kamieniecki"). In view of the amendments and following remarks, allowance of claims 53-57 is respectfully requested.

1. Claim 53 was objected to because line 10 of the claim recited "said surface voltage sensor" instead of "said surface photovoltaic sensor." Applicants have amended claim 53 in part to correct this informality and submit the claim amendment should obviate this claim objection.
2. Claims 53-57 were rejected under 35 U.S.C. §102(b) as being anticipated by Kamieniecki. The Office Action states "[r]egarding claim 53, Kamieniecki discloses [see fig. 17] an apparatus for making surface photovoltaic measurements of a semiconductor comprising a sealed chamber (represented as enclosure 197) [see column 12 lines 15-19] for processing the semiconductor wafer (represented as specimen 11) [see column 4 lines 34-37 and column 6 lines 32-36] and a head assembly (represented as reference electrode assembly 199) having a modulated light source (43) inherently exposing at least a portion of the semiconductor wafer (11) to light having a wavelength and modulated at a frequency [see column 7 lines 29-35 and lines 49-62 and column 12 lines 39-42] and a surface photovoltaic sensor (represented as reference electrode 203) inherently detecting a surface photovoltaic induced at the surface of the semiconductor wafer (11) in response to the light [via light source 43] without contacting the wafer (11) [see column 12 lines 39-50], wherein the photovoltaic is used to calculate an electrical property of the semiconductor wafer (11) [see Abstract], said surface photovoltaic sensor (203)

of head assembly (199) located within the sealed chamber (197). Regarding claims 54-56 Kamieniecki inherently discloses the sealed chamber (197) as a reduced pressure chamber, a chemically reactive gas chamber or an inert environmental chamber [see column 12 lines 15-16 and column 13 lines 42-46]. Regarding claim 57, Kamieniecki discloses [see fig. 17] the head assembly (199) is entirely located within the sealed chamber (197)."

For the rejection under 35 U.S.C. §102 to be proper, the prior art reference must disclose all of the claim limitations. Applicant respectfully submits that Kamieniecki does not disclose every claim element of the claimed invention as presently amended. Applicant has amended claim 53 to include the limitations of a plurality of electrodes to the surface photovoltage sensor that are adjacent the first surface of the wafer such that, the plurality of electrodes is sufficient for detecting the surface photovoltage on the first surface of the wafer.

The claimed invention relates to a wafer fabrication system which includes a head assembly. The head assembly includes a modulated light source and a surface photovoltage sensor. The modulated light source exposes the wafer under evaluation to light of a wavelength and modulated at a frequency, thereby generating a surface photovoltage. The surface photovoltage sensor detects and measures this surface photovoltage. The plurality of electrodes located on the surface photovoltage sensor are located adjacent the first surface of the wafer and are sufficient to measure the surface photovoltage without contacting the wafer. Therefore, there is no need for a back electrode or for the wafer itself to be connected to ground during the measurement. Support for the amended claim can be found at least on page 16 lines 5-21 of the specification. No new matter has been added.

In contrast, Kamieniecki disclosed an apparatus for measuring the surface photovoltage by requiring in almost all embodiments that the probe assembly be in contact with the wafer. When the surface photovoltage is measured according to this reference, the probe assembly must be held in close compliance with the wafer surface either by pressure or magnetic field. (col. 4, lines 41-55). The probe assembly is actually pressed down against the wafer surface. (col. 7, lines 39-46).

In only one embodiment, does Kamieniecki disclose that the surface photovoltage is to be measured while the probe assembly is spaced above the wafer surface by a predetermined distance. (col. 12 lines 13 - 50). However, this embodiment requires, as do all the other embodiments of Kamieniecki, that the wafer be seated on a back electrode which consists of a conductive metal connected to ground. (col. 6 lines 37-45). It is because the electrodes included

in the probe assembly are insufficient to measure the surface photovoltaic voltage, that the wafer must either be seated on a back electrode connected to ground or itself be connected to ground.

Claim 53 has been amended as to more specifically point out how the claimed invention achieves electrical characterization of the surface of the wafer, without physical contact between the probe assembly and the wafer and without the necessity of grounding the wafer or the back electrode in the form of a support. Kamieniecki does not disclose the claimed language with respect to the surface photovoltaic sensor. Applicants submit that claim 53 as amended is allowable and request early favorable action by the Examiner. Applicants further submit that claims 54-57 are also allowable as depending from an allowable base claim.

Reconsideration and withdrawal of the rejection of claims 53-57 under 35 U.S.C. §102(b) as being anticipated by Kamieniecki is respectfully requested.

3. As the Examiner has recognized, none of U.S. Patent No. 5,369,495 to Lagowski, U.S. Patent No. 5,963,783 to Lowell et al, and U.S. Patent No. 6,166,354 to Hause et al, anticipate or render obvious Applicant's claimed invention, either alone or in combination with the art of record.

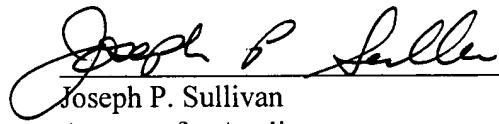
CONCLUSION

Applicant respectfully requests entry of this amendment and response, withdrawal of all bases of rejection, and allowance of claims 53-57 in due course. The Examiner is invited to telephone Applicant's under signed representative at (617) 248-7677 to discuss any outstanding issues.

Respectfully submitted,

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Amended claims with insertions and deletions shown

53. (Twice Amended) A semiconductor wafer fabrication system comprising:
a sealed chamber for processing said semiconductor wafer having a first surface and a second surface; and a head assembly comprising:
a modulated light source exposing at least a portion of said semiconductor wafer to light having a wavelength and modulated at a frequency; and
a surface photovoltage sensor comprising a plurality of electrodes positioned adjacent said first surface to detecting a surface photovoltage induced at the said first surface of said semiconductor wafer in response to said light without contacting said wafer, wherein said photovoltage is used to calculate an electrical property of said semiconductor wafer
said plurality of electrodes sufficient for detecting said surface photovoltage on said first surface; and
said surface photovoltage sensor of said head assembly located within said sealed chamber.